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DOCUMENT-IDENTIFIER: US 5884287 A

TITLE: System and method for generating and displaying risk and return in an investment portfolio

DATE-ISSUED: March 16, 1999

INVENTOR-INFORMATION:

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FIELD-OF-SEARCH: 705/36, 705/35

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

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	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4839804	June 1989	Roberts	364/408
☐	4953085	August 1990	Atkins	364/408
☐	5132899	July 1992	Fox	364/408
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OTHER PUBLICATIONS

William N. Goetzman, "An Introduction to Investment Theory", Yale School of Management, Apr. 9, 1997, Class Notes.
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ART-UNIT: 275

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ABSTRACT:

The present invention is a computer-implemented system and method to create an optimal investment plan given wealth goals stated in probabilistic form, and to display the resulting probability distributions of wealth accumulations at future times where the method provides inputs for entering and storing in a computer target and fallback scenarios and required probabilities, computes rate of return values responsive to the user input, generates an efficient portfolio array, computes probabilities for the efficient portfolio array related to the rate of return values, iteratively compares the array probabilities so that the target and fallback scenario probabilities are satisfied and an optimum efficient portfolio is selected and then provides a graphical representation of the selected efficient portfolio.

14 Claims, 7 Drawing figures

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L21: Entry 49 of 51 File: USPT Mar 16, 1999

DOCUMENT-IDENTIFIER: US 5884287 A
TITLE: System and method for generating and displaying risk and return in an investment portfolio

Abstract Text (1):
The present invention is a computer-implemented system and method to create an optimal investment plan given wealth goals stated in probabilistic form, and to display the resulting probability distributions of wealth accumulations at future times where the method provides inputs for entering and storing in a computer target and fallback scenarios and required probabilities, computes rate of return values responsive to the user input, generates an efficient portfolio array, computes probabilities for the efficient portfolio array related to the rate of return values, iteratively compares the array probabilities so that the target and fallback scenario probabilities are satisfied and an optimum efficient portfolio is selected and then provides a graphical representation of the selected efficient portfolio.

Brief Summary Text (7):
Dr. Markowitz's method assumes investment returns in an array of asset classes over a given fixed time period follow a multi variate probability distribution with finite expected value vector and covariance matrix. The method then seeks to combine the asset classes in linear combination so as to achieve the singly-dimensioned probability distribution of investment returns with the maximum expected value for a given standard deviation (or the minimum standard deviation for a given expected value). The method of optimization is known as quadratic programming. Dr. Markowitz originated a quadratic programming algorithm to solve this mean-variance optimization problem, but other quadratic programming algorithms can also be utilized.

Detailed Description Text (4):
Referring to FIG. 2, there is shown generally a block diagram of a system and method 100 which includes the processes and computer-based interactive display techniques for characterizing and optimizing an investment plan, including the asset allocation decision and the determination of future goals and net contribution schedules. The system first provides for input of a user for selected target and fallback investment inflows and outflows and their corresponding probabilities. Step 50. A required rate of return to achieve the target and fallback scenarios is calculated along with an array of efficient portfolios. Step 60. The probabilities for achieving the required rates of return as previously determined are then calculated for each efficient portfolio and compared with the required target and fallback probabilities. Step 70. Once a match is made the results are provided to the user in an interactive display environment. Step 80.

Detailed Description Text (9):
In the general case, "the investor" is any person or entity capable of stating investment goals as probabilities of achieving specified future levels of wealth accumulation at specified future horizon dates. These future levels of wealth accumulation may be derived as present values of future spending levels planned to occur subsequent to the horizon dates. In the latter case the future wealth accumulation goals may be seen to represent liabilities for subsequent outlay

requirements. Future cash flows and wealth are assumed to be in real, i.e. inflation-adjusted, terms.

Detailed Description Text (11):
For each of the two scenarios, a minimum required rate of return to achieve the goal is calculated. Step 110. The standard rate of return r is the solution to the equation f(r)=0 where f(r) is given by the equation: ##EQU1## where V.sub.o is the asset value at the start of an n-year period

Detailed Description Text (13):
V.sub.n is the required asset value at the end of the n-year period

Detailed Description Text (19):
Referring to FIG. 4, there is shown an interactive computer-based graphical embodiment of the interactive process of goal revision and portfolio optimization. In this embodiment, the investor is an individual formulating an investment plan to provide for children's education, retirement income, a bequest, and other major future expenditures. The horizon date for each scenario is generally the investor's retirement age, which may be different for the two scenarios. The optimum allocation for the initial formulations of the scenarios is initially displayed on the screen, together with the probabilities (i.e. likelihoods) of achieving the goals with this optimal investment allocation. The wealth goals are calculated as the present-value liabilities, as of the horizon dates, for the future planned withdrawals from the investment account for retirement income, bequest, and any other post-horizon expenditures.

Issued US Original Classification (1):
705/36

Current US Original Classification (1):
705/36

Field of Search Class/SubClass (1):
705/36

Other Reference Publication (5):
Edessess, Michael et al. "Scenario forecasting: Necessity, not choice." Journal of Portfolio Management, vol. 6 No. 3, pp. 10-15, Sprg 1980.

CLAIMS:

1. A computer implemented method for generating an optimal investment plan in probabilistic form and for displaying resulting probability distributions, the method utilizing a computer having a processor programmed to electrically process input data and output data, the processor being electrically connected to a keyboard and a visual display screen, the method comprising the steps of:

inputting target and fallback scenarios and required probabilities;

computing rate of return values responsive to the target and fallback scenarios;

generating an efficient portfolio array;

computing probabilities for the efficient portfolio array responsive to the rate of return values;

comparing iteratively the array probabilities so that the target and fallback scenario probabilities are satisfied to select a qualified portfolio; and

providing a graphical representation in a teardrop graph format of the resulting

probability distributions.

2. The method of claim 1 wherein the rate of return is calculated by the following formula: ##EQU3## where V.sub.o is the asset value at the start of an n-year period, C.sub.i is the net addition (contribution) to assets at the beginning of the i'th year, and V.sub.n is the required asset value at the end of the n-year period.

6. A system for generating an optimal investment plan in probabilistic form and for displaying resulting probability distributions, the system utilizing a computer having a processor programmed to electrically process input data and output data, the processor being electrically connected to a keyboard and a visual display screen, the system comprising:

data means for entering and storing in the computer target and fallback scenarios and associated required probabilities;

means for computing rate of return values responsive to the first data means;

means for generating an efficient portfolio array;

means for computing probabilities for the efficient portfolio array related to the rate of return values;

comparison means for iteratively comparing the array probabilities so that the target and fallback scenario probabilities are satisfied and an optimum efficient portfolio is selected; and

display means for providing a graphical representation in a teardrop graph format of the resulting probability distributions.

7. The system of claim 6 wherein the rate of return is calculated by the following formula: ##EQU4## where V.sub.o is the asset value at the start of an n-year period, C.sub.i is the net addition (contribution) to assets at the beginning of the i'th year, and V.sub.n is the required asset value at the end of the n-year period.

10. A system for generating an optimal investment plan in probabilistic form and for displaying resulting probability distributions, the system comprising:

data means for entering and storing in a computer target and fallback scenarios and required probabilities;

means for computing rate of return values responsive to the first data means;

means for generating an efficient portfolio array;

means for computing probabilities for the efficient portfolio array related to the rate of return values;

comparison means for iteratively comparing the array probabilities so that the target and fallback scenario probabilities are satisfied and an optimum efficient portfolio is selected; and

display means for providing a teardrop graphical representation of the resulting probability distributions.

11. The system of claim 10 wherein the rate of return is calculated by the following formula: ##EQU5## where V.sub.o is the asset value at the start of an n-year period, C.sub.i is the net addition (contribution) to assets at the beginning

of the i'th year, and V.sub.n is the required asset value at the end of the n-year period.

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